

## **Automatic External Defibrillators**

Ventricular Fibrillation (VENTRICULAR FIBRILLATION) is a chaotic ventricular rhythm resulting in non-perfusing ventricular movement i.e. no actual ventricular contractions. VENTRICULAR FIBRILLATION is the most common initial rhythm disturbance in sudden cardiac arrest. There are multiple causes for VENTRICULAR FIBRILLATION. The most common causes include, but are not limited to: acute myocardial infarction, myocardial ischemia (angina), cardiomyopathy, digitalis toxicity, hypoxemia, acidosis, electrolyte disturbances, electrocution and drug overdose or toxicity.

The need for early defibrillation is clear and should have the highest priority for patients in Ventricular Fibrillation and/or Pulseless Ventricular Tachycardia. Since these patients will all be in cardiac arrest, adjunctive equipment should not divert attention or effort from Basic Cardiac Life Support (BCLS) resuscitative measures; early defibrillation and Advanced Cardiac Life Support (ACLS). Remember: rapid defibrillation and early ACLS are the major determinants of survival.

Different brands and models of AED have a variety of features and controls and may differ in characteristics such as paper strip recorders, rhythm display methods, energy levels, and messages to the operator. Each EMS provider must be properly trained to utilize the AED in a timely manner.

**AEDs utilizing biphasic technology are acceptable for prehospital usage, as well as those utilizing pre-existing monophasic technology. There is no current consensus regarding the risks/benefits associated with energy levels (fixed or escalating) utilized in biphasic technology, or the risks/benefits of rectilinear versus truncated exponential biphasic technology. The specific device will vary from service to service; the use of any individual device must be based upon FDA approval and the recommendations of the manufacturer's guidelines.**

### **ASSESSMENT / TREATMENT PRIORITIES**

1. Maintain appropriate body substance isolation precautions.
2. Determine unresponsiveness, absence of breathing and pulselessness.
3. Consider all potential non-cardiac causes of cardiac arrest. (i.e. trauma, overdose, electric shock, etc.)
4. Initiate CPR and assist ventilations while awaiting defibrillator.
5. Basic and/or Intermediate providers must activate a paramedic level system (ACLS) as soon as possible, if available.
6. Contraindications: consciousness; respiratory arrest with pulses; obvious signs & symptoms of death; children under 8 years of age and under or weighing less than 25kg (55lbs) and/or while in a moving ambulance.
7. Contact Medical Control.

## **TREATMENT: 1st RESPONDERS / BASIC EMTs**

1. Maintain appropriate body substance isolation precautions.
2. Determine unresponsiveness and cardiopulmonary arrest.
3. Initiate CPR.
4. Administer high concentration of oxygen with assisted ventilations.
5. Initiate early defibrillation if AED is immediately available.
  - a. Perform CPR until defibrillator is available, attached and operable.
  - b. Turn defibrillator on.
  - c. Attach defibrillator electrodes to patient while verbalizing (when applicable) report to AED recorder.
  - d. Analyze rhythm status.
  - e. Determine if defibrillation (shock) is indicated or not.
6. Activate ALS intercept as soon as possible, if available.

7. **(a) If shock is indicated:**

**SHOCK INDICATED:** Follow sequence:  
(energy ranges depending on machine)

- \* **Defibrillate**, 1st setting (200-240 J) reanalyze cardiac status (ECG). If shock indicated,
- \* **Defibrillate**, 2nd setting (200-300 J) reanalyze cardiac status (ECG). If shock indicated,
- \* **Defibrillate**, 3rd setting (300-360 J)

If no pulse, continue CPR for one (1) minute.

Reanalyze cardiac status (ECG/Pulses). If shock indicated,  
Repeat set of three (3) shocks 360 J.

**IF SHOCK INDICATED:** Follow sequence:

- \* **Defibrillate**, 360 J reanalyze cardiac status (ECG). If shock indicated,
- \* **Defibrillate**, 360 J reanalyze cardiac status (ECG). If shock indicated,
- \* **Defibrillate**, 360 J

If no pulse, continue CPR for one (1) minute.

Reanalyze cardiac status (ECG/Pulses). If shock indicated, Repeat set of three (3) shocks 360 J.

**IF SHOCK INDICATED:** Follow sequence:

- \* **Defibrillate**, 360 J reanalyze cardiac status (ECG). If shock indicated,
- \* **Defibrillate**, 360 J reanalyze cardiac status (ECG). If shock indicated,
- \* **Defibrillate**, 360 J

If no pulse, continue CPR.

**Initiate transport after third one minute CPR sequence, with or without ALS.**  
Notify receiving hospital.

**\*\*\*Contact Medical Control. ~**

**Medical Control will determine if additional Analysis or Defibrillation is required prior to transport.**

**\*Note: Never analyze while vehicle is in motion. Vibration may interfere with appropriate reading, and may cause accidental electrical discharge**

**\*\* NOTE: Biphasic defibrillators shock at lower energy levels and are without Joule selection capabilities.**

7. (b) **If no shock is indicated:**

**NO SHOCK INDICATED:** Follow sequence:

**Check pulse.**

If no pulse, continue CPR for one (1) minute.

**Reanalyze cardiac status (ECG/Pulses)**

- a. If shock indicated, follow shock indicated protocol.
- b. If no shock indicated, check pulse.

**Check pulse.**

If no pulse, continue CPR for one (1) minute.

**Reanalyze cardiac status (ECG/Pulses)**

- a. If shock indicated, follow shock indicated protocol.
- b. If no shock indicated, check pulse.

**Check pulse.**

If no pulse, continue CPR for one (1) minute.

**Reanalyze cardiac status (ECG/Pulses)**

- a. If shock indicated, follow shock indicated protocol.
- b. If no shock indicated, check pulse.

After three (3) "**NO SHOCK**" messages are received,

Initiate transport as soon as possible, with or without ALS.

Notify receiving hospital.

During transport, reanalyze cardiac status (ECG/Pulses) after every 3-5 minutes of CPR or as directed by Medical Control. If shock is indicated, follow Shock Indicated Protocol.

**NOTE:**

1. If a palpable pulse is present, proceed with appropriate airway management techniques and continually monitor patient's pulse, not EKG.
2. If at any time the patient becomes pulseless: immediately reanalyze patient to determine if defibrillation is indicated. If advised and possible, begin shock at last level which successfully converted patient's cardiac rhythm.
3. If the AED states during transport that you should check the patient, immediately stop the vehicle, and reanalyze per protocol.
4. For patients with known Internal Cardiac Defibrillators (ICD), attach the AED and follow standard operating procedures.

**COORDINATION OF ACLS PROVIDERS WITH PERSONNEL USING AED**

With the increasing availability of AEDs/SAEDs, ALS-trained emergency personnel will interact frequently with AED-trained personnel. The following guidelines are suggested for this interface:

1. ALS-trained (and authorized) providers always have authority over the scene.
2. Upon arrival, ALS-trained providers should ask for a quick report from the automated defibrillation providers and direct them to proceed with their protocols. This is particularly applicable when ALS-trained providers are unfamiliar with the operation of the AED.
3. ALS-trained providers should use the AED for additional shocks and rhythm monitoring whenever possible. They can direct the providers to operate the AED. To save time, avoid disorganization, and allow a coordinated transfer of care, ALS providers should not remove the AED and attach a separate conventional defibrillator unless the AED in use lacks a rhythm display screen and/or is a biphasic defibrillator device with incompatible electrodes. Most AEDs have the capacity for manual override by ALS-trained providers, should that be necessary. The method and ease of manual override will vary among models.
4. ALS-trained providers should consider the shocks delivered by the AED operators as part of their ALS protocols. For example, if the patient remains in VENTRICULAR FIBRILLATION after three shocks by the AED, then ALS personnel should enter the ALS VENTRICULAR FIBRILLATION treatment sequence at the point at which the first three shocks have been delivered. Consequently, ALS providers should move immediately to perform endotracheal intubation, establish IV line access, and administer epinephrine.
5. In most circumstances, the AED should be removed and a conventional defibrillator attached only when the patient has regained a spontaneous rhythm or is ready for transport to another location. Some models of AEDs/SAEDs lack a rhythm display monitor; thus, ALS personnel will want to attach a conventional defibrillator when clinically convenient.